Session: Physics

PHASE SYNCHRONIZATION IN A BIDIRECTIONALLY COUPLED CHUA-PLASMA SYSTEM

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We observe experimental phase synchronization of two coupled chaotic oscillators: a chua circuit and Geissler plasma discharge tube. A variable resistor enables manipulation of the bidirectional coupling strength. We exploit the inverse relationship of resistance and coupling strength. Time evolution mappings provide evidence of 2π phase slips characteristic of phase transitions for coupled systems. Real-time data acquisition yields immediate information on the behavior of the system including attractor maps and power spectrums. This real-time analysis provides a roadmap to tuning the system towards specific behaviors. Future implications of the research include competition of several coupled chaotic oscillators analogous to neuron competition in biological systems.